FORM PTO-1390 US DEPARTMENT OF COMMERCE REV. 5-93PATENT AND TRADEMARK OFFICE **TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371**		ATTORNEYS DOCKET NUMBER **P01,0043** U.S. APPLICATION NO. (if known, see 37 CFR 1.5) 09/787730
INTERNATIONAL APPLICATION NO. **PCT/DE99/02889**	INTERNATIONAL FILING DATE **13 SEPTEMBER 1999**	PRIORITY DATE CLAIMED **23 SEPTEMBER 1998**

TITLE OF INVENTION

METHOD FOR IDENTIFYING A HUB CONNECTING A COMMUNICATION TERMINAL AND A SWITCHING SYSTEM

APPLICANT(S) FOR DO/EO/US

WOLFGANG FRAAS, ET AL.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay.
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.

5. ☒ A copy of International Application as filed (35 U.S.C. 371(c)(2)).
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2).

7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. §371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.

8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).

9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).

10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 C.F.R. 1.97 and 1.98; **(PTO 1449, Prior Art, Search Report, References).**

12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 C.F.R. 3.28 and 3.31 is included.
    (SEE ATTACHED ENVELOPE)

13. ☒ Amendment "A" Prior to Action.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.

14. ☒ A substitute specification and substitute specification mark-up.

15. ☒ A change of address letter attached to the Declaration.

16. ☒ Other items or information:
    a. ☒ Submission of Drawings
    b. ☒ EXPRESS MAIL #EL 843728606 US dated March 21, 2001

JC10 Rec'd PCT/PTO 21 MAR 2001

U.S. APPLICATION NO. (if known, see 37 C.F.R. 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
09/787730	PCT/DE99/02889	P01,0043

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
BASIC NATIONAL FEE (37 C.F.R. 1.492(a)(1)-(5): Search Report has been prepared by the EPO or JPO $860.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) $690.00 No international preliminary examination fee paid to USPTO (37 C.F.R. 1.482) but international search fee paid to USPTO (37 C.F.R. 1.445(a)(2) $710 00 Neither international preliminary examination fee (37 C.F.R. 1.482) nor international search fee (37 C.F.R. 1.445(a)(2) paid to USPTO $1000.00 International preliminary examination fee paid to USPTO (37 C.F.R. 1.482) and all claims satisfied provisions of PCT Article 33(2)-(4) $ 100.00		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 860.00	
Surcharge of $130.00 for furnishing the oath or declaration later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 C.F.R. 1.492(e)).	$	

Claims	Number Filed		Number Extra	Rate		
Total Claims	13	-20 =	0	X $ 18.00	$	
Independent Claims	01	- 3 =	0	X $ 80.00	$	
Multiple Dependent Claims				$270.00 +	$	
TOTAL OF ABOVE CALCULATIONS =					$ 860.00	
Reduction by ½ for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 C.F.R. 1.9, 1.27, 1.28)					$	
SUBTOTAL =					$ 860.00	
Processing fee of $130.00 for furnishing the English translation later than ☐ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(f)). +					$	
TOTAL NATIONAL FEE =					$ 860.00	
Fee for recording the enclosed assignment (37 C.F.R. 1.21(h). The assignment must be accompanied by an appropriate cover sheet (37 C.F.R. 3.28, 3.31). $40.00 per property +						
TOTAL FEES ENCLOSED =					$ 860.00	
					Amount to be refunded	$
					charged	$

a. ☒ A check in the amount of $860.00 to cover the above fees is enclosed.

b. ☐ Please charge my Deposit Account No._____ in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. ☒ The Commissioner is hereby authorized to charge any additional fees which maybe required, or credit any overpayment to Deposit Account No. 50-1519. **A duplicate copy of this sheet is enclosed.**

NOTE: Where an appropriate time limit under 37 C.F.R. 1.494 or 1.495 has not been met, a petition to revive (37 C.F.R. 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

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SIGNATURE

STEVEN H. NOLL
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BOX PCT

IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY – CHAPTER II

AMENDMENT "A" PRIOR TO ACTION AND SUBMISSION OF SUBSTITUTE SPECIFICATION

APPLICANT(S):	FRAAS, W., et al.
ATTORNEY DOCKET NO:	P01,0043
INTERNATIONAL APPLICATION NO:	PCT/DE99/02889
INTERNATIONAL FILING DATE:	13 SEP 1999
INVENTION:	METHOD FOR IDENTIFYING A HUB CONNECTING A COMMUNICATION TERMINAL AND A SWITCHING SYSTEM

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Applicants herewith submit an amendment and substitute specification in the above-referenced PCT application, and request entry of same prior to examination in the United States National Stage.

IN THE SPECIFICATION

Cancel the specification as filed, and insert therefore the substitute specification provided herewith.

IN THE CLAIMS

Cancel claims 1 –13 as filed, and insert therefore new claims 14 - 26

as follows:

- - What is claimed is:

14. A method for identifying a hub connected between a communication terminal and a switching system, wherein a plurality of hubs are connected to the switching system via a communication network, the method comprising the steps of:

forming a time-slot-oriented data format from a periodic sequence of channel-oriented information segments;

connecting the communication terminals to the hubs;

setting up a data transmission between the switching system;

associating the hubs with an unambiguous address in the communication network; and

transmitting the address of a hub via the communication network to the switching system in an agreed information segment upon request.

15. The method of claim 14, wherein the request is made during a message transmission from the switching system to the communication terminal.

16. The method of claim 14, wherein the request is made during a message transmission from the communication terminal to the switching system.

17. The method of claim 16, wherein the address is transmitted in a monitor channel transmitting configuration information of the time-slot-oriented data format.

18. The method of claim 17, further comprising the step of:

indicating the request by transmitting an agreed bit combination in a signaling channel of the time-slot-oriented data format.

19. The method of claim 17, further comprising the step of:

indicating the request by a simplified protocol being transmitted in at lease one of, the signaling channel or a monitor channel, which transmits configuration information concerning the time-slot-oriented data format.

20. The method of claim 19, wherein the time-slot-oriented data format is the standardized IOM-2 data format.

21. The method of claim 20, further comprising the step of:

indicating the request by bits transmitted via monitor status channels of the IOM-2 data format to the hub being identical.

22. The method of claim 21, wherein the address length is one of, 1 byte, or an integral multiple thereof.

23. The method of claim 22, wherein a data transmission via the communication network takes place on the basis of the ATM data format.

24. The method of claim 23, wherein a bi-directional conversion is made between the time-slot-oriented data format and the ATM data format for transmitting data via the communication network by the switching system and the hub.

25. The method of claim 24, wherein the bi-directional conversion between the time-slot-oriented data format and the ATM data format takes place in accordance with a first ATM adaptation layer AAL-Typ1.

26. The method of claim 25, wherein the bi-directional conversion between the time-slot-oriented data format and the ATM data format takes place in accordance with a second ATM adaptation layer AAL-Typ2. - -

IN THE ABSTRACT

Cancel the Abstract as filed and insert therefore on a separate page, the following Abstract of the Disclosure:

- - ABSTRACT OF THE DISCLOSURE

Communication terminals are connected to a communication network via at least one hub having an unambiguous address in the communication network. Data transmission between the switching system and the communication terminals is provided using a time-slot-oriented data format formed from a periodic sequence of channel-oriented information segments. The address of the hub is transmitted from the hub to the switching system in an agreed information segment. - -

REMARKS

A substitute specification and a proper abstract of the disclosure are provided herewith which make editorial changes in order to conform to standard US practice. A marked-up copy of the specification is also provided reflecting the changes made.

In addition, the claims as filed have been canceled and replaced by new claims that more clearly set forth Applicants' invention.

No new matter has been inserted into the application.

Applicants submit that this application is in proper condition for examination in the United States National Stage, which action is earnestly solicited.

Respectfully submitted,

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BOX PCT

IN THE UNITED STATES DESIGNATED/ELECTED OFFICE
OF THE UNITED STATES PATENT AND TRADEMARK OFFICE
UNDER THE PATENT COOPERATION TREATY – CHAPTER II

SUBMISSION OF DRAWINGS

APPLICANT(S):	FRAAS, W., et al.
ATTORNEY DOCKET NO:	P01,0043
INTERNATIONAL APPLICATION NO:	PCT/DE99/02889
INTERNATIONAL FILING DATE:	13 SEP 1999
INVENTION:	METHOD FOR IDENTIFYING A HUB CONNECTING A COMMUNICATION TERMINAL AND A SWITCHING SYSTEM

Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Applicants herewith submit four drawing sheets, showing Figures 1 – 4 in the captioned PCT application.

Respectfully submitted,

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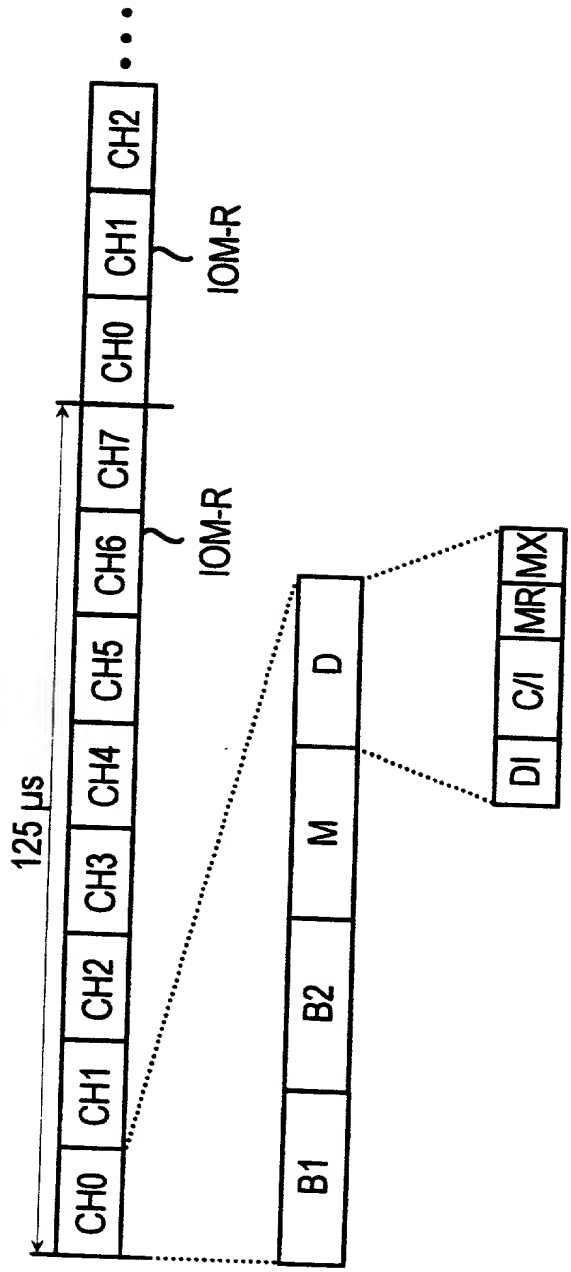
Fig 1



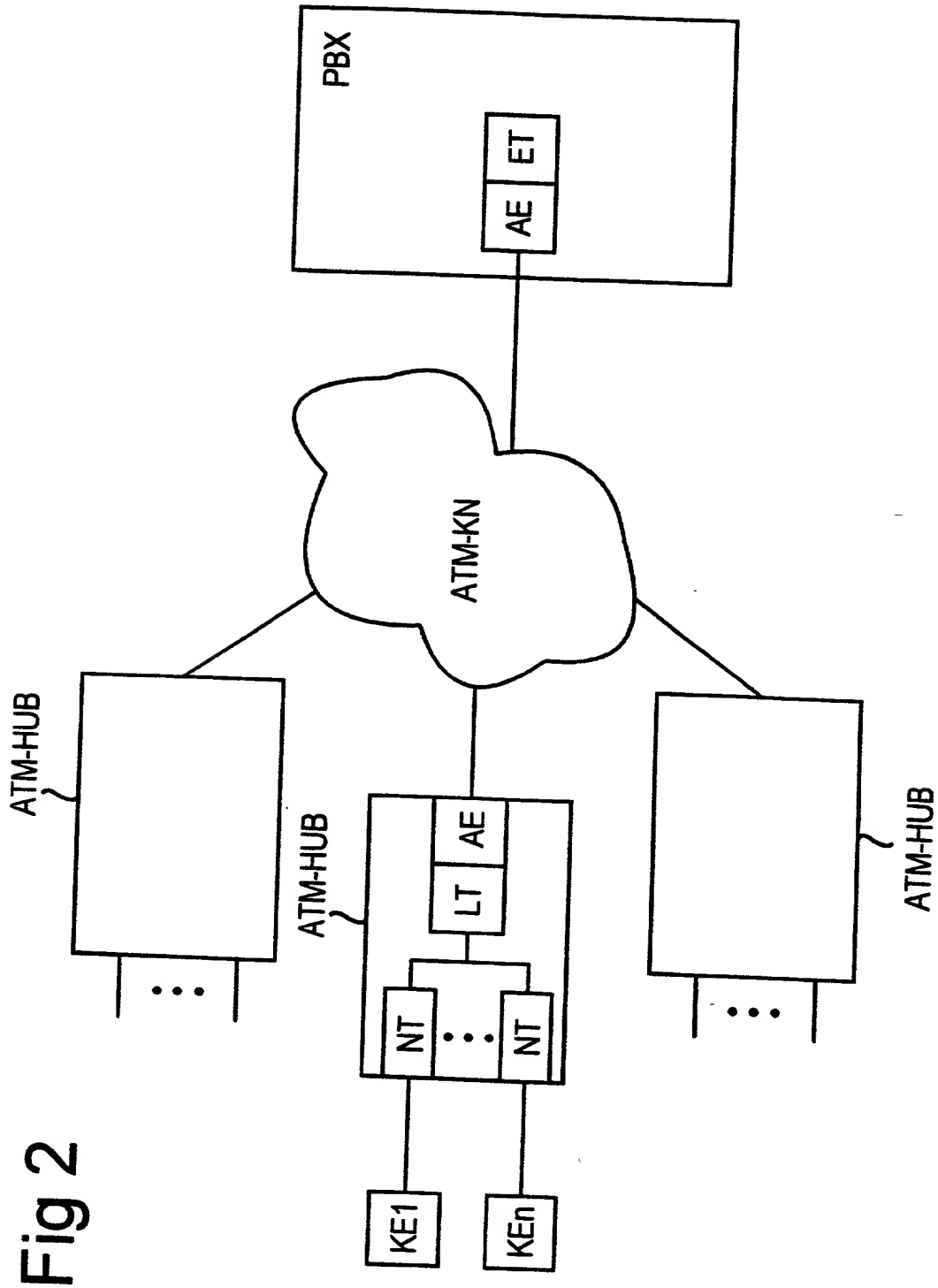


Fig 2

Fig 3

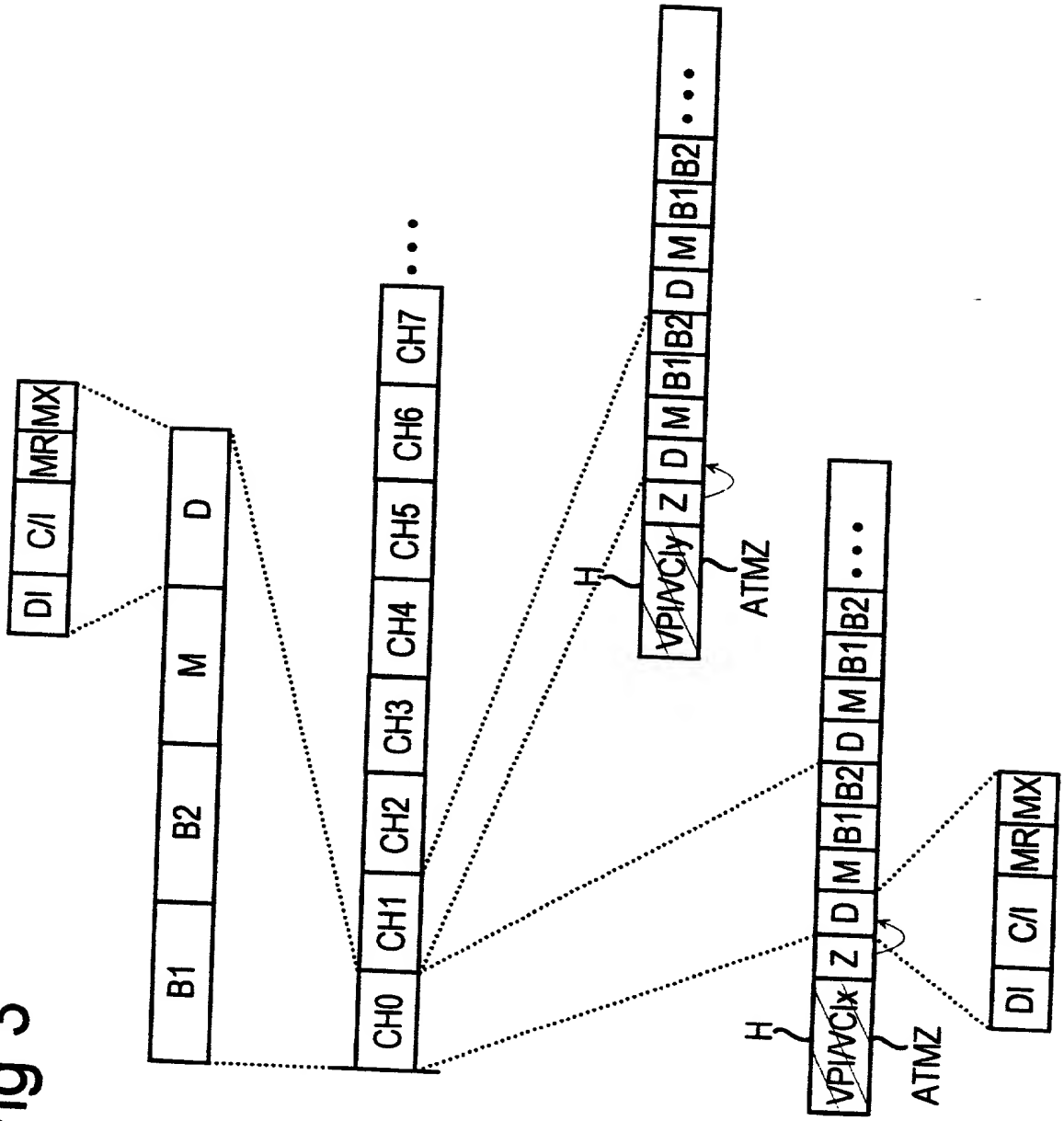
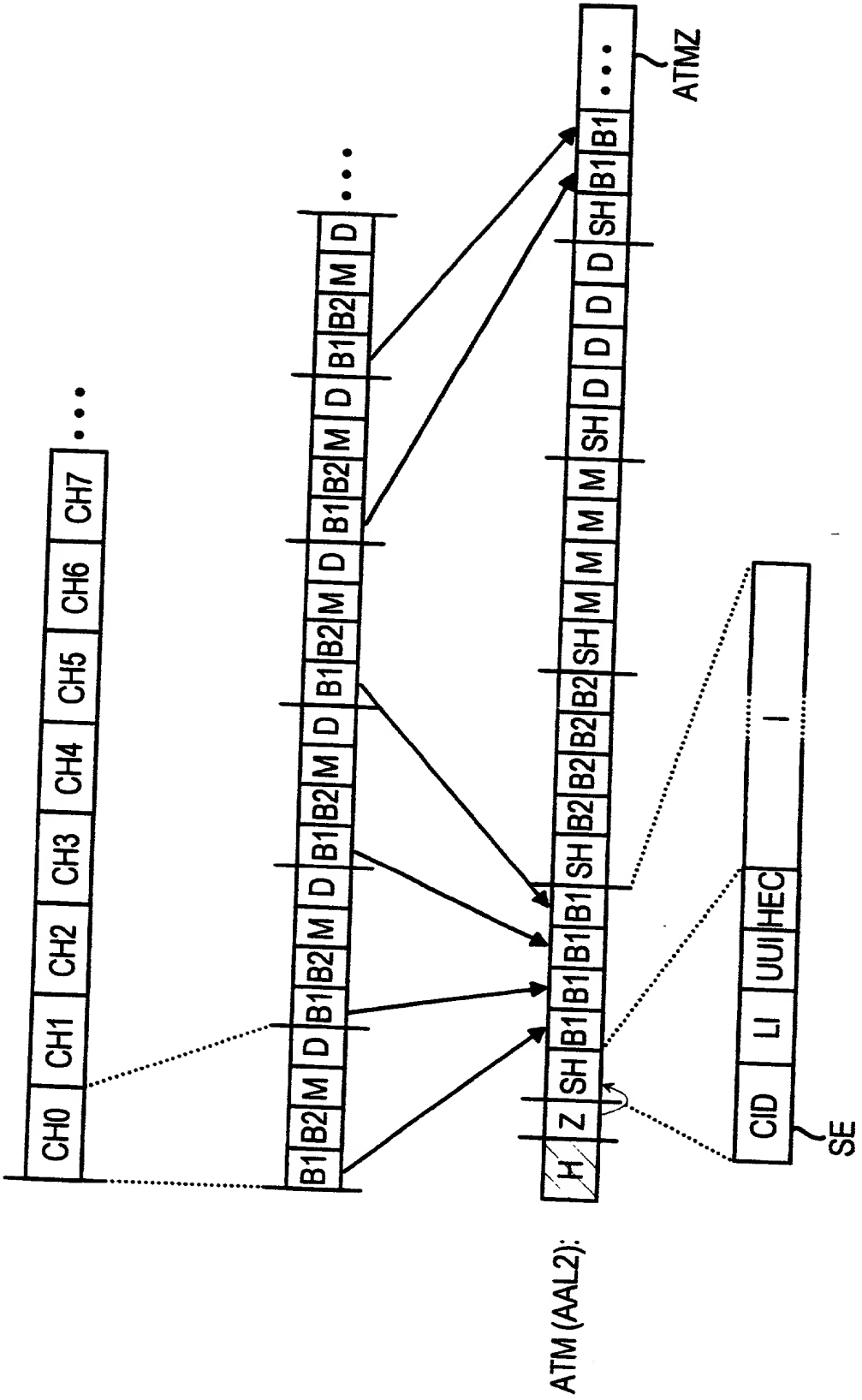


Fig 4



Substitute Specification:

- - METHOD FOR IDENTIFYING A HUB CONNECTING A COMMUNICATION TERMINAL AND A SWITCHING SYSTEM

BACKGROUND OF THE INVENTION

Field of the Invention:

The present invention pertains to data transmission systems generally, and in particular to transmission systems for time-slot-oriented data.

Discussion of the Related Art:

A transmission system for transmitting time-slot-oriented data between an exchange termination and a line termination is usually part of a communication system having a switching facility and subscriber line facilities. The subscriber line facilities have subscriber interfaces for connecting communication terminals to the communication system.

According to the ITU-T G.960 Standard, the subscriber line facilities are connected to the switching facility of the communication system via a line termination and an exchange termination. Such a communication system is used for setting up and, respectively, clearing down narrow-band communication connections between communication terminals connected to the subscriber line facilities and to provide for narrow-band

communication - for example voice or data communication - between the communication terminals.

In modern communication systems, data transmission between the exchange termination and the line termination usually takes place on the basis of the time-slot-oriented data format IOM-2 (ISDN Oriented Modular Interface) formed from a periodic sequence of channel-individual information segments - called time-division multiplex channel in the text which follows. As a rule, one time-division multiplex channel is in each case allocated to each subscriber interface of a subscriber line facility in this arrangement.

In modern communication engineering, there is a need for broadband transmission of information such as, for example, still and moving pictures in videophone applications or of large volumes of data in the Internet. This increases the significance of transmission techniques for high and variable data transmission rates (greater than 100 Mbit/s) which take into account both the requirements of the data transmission (high speed at variable transmission bit rate) and the requirements of voice data transmission (maintaining time correlations with a data transmission via a network) so that the separate networks currently existing for the various purposes can be integrated in one network. A known data transmission method for high data speeds is the so-called Asynchronous Transfer Mode (ATM). Data transmission on the basis of the Asynchronous Transfer Mode

currently enables a variable transmission bit rate of up to 622 Mbit/s to be obtained.

In the cell-based data transmission method known as Asynchronous Transfer Mode (ATM), so-called ATM cells are used for transporting fixed-length data packets. An ATM cell is composed of a so-called "header" with a length of five bytes which contains switching data relevant to the transportation of an ATM cell, and a so-called "payload" with a length of 48 bytes.

Data transmission via an ATM-based network generally takes place in so-called virtual paths or virtual channels. For this purpose, interconnection tables with switching information consisting of a virtual channel identifier and of a virtual path identifier are set up in the respective ATM network nodes of the ATM-based network by an exchange of signaling information during a connection set-up before the beginning of the actual user data transmission. In the interconnection tables, a so-called VCI value is assigned to the virtual channel identifier and a so-called VPI value is assigned to the virtual path identifier.

The switching information entered in the interconnection table of an ATM network node establishes how the virtual paths or, respectively, virtual channels contained in the virtual paths of the incoming and outgoing connections at the ATM network node are correlated with one another by the signaling, that is to say which input is connected to which output by a

switching. ATM cells transmitted via these virtual connections (virtual paths and virtual channels) have switching data essentially consisting of a VPI value and a VCI value in the header. The ATM header data are processed, i.e. the switching data arranged therein are detected and evaluated at the input of an ATM network node. The ATM cells are then switched through by the ATM network node to an output of the ATM network node representing a certain destination by means of the switching information stored in the interconnection table.

German Offenlegungsschrift DE 196 04 244 A1, shows a transmission system between an exchange termination and a line termination in which transmission is implemented via an ATM-based network. In this arrangement, subscriber interfaces for connecting ISDN (Integrated Services Digital Network) oriented communication terminals by ATM hubs connected to the ATM-based network are provided. The exchange termination of the communication system and the line termination implemented by the ATM hub have an ATM interface unit via which, on the one hand, a connection to the ATM-based network is implemented and, on the other hand, the IOM-2 data format usually provided for a data transmission between the exchange termination and the line termination is converted to the ATM-based data format. Or, the ATM-based data format is converted to the IOM-2 data format.

For addressing a subscriber interface of the ATM hub via the ATM-

based network, a permanently set up ATM channel of the ATM-based network is allocated to each time-division multiplex channel of the IOM-2 data format, i.e. an unambiguous VPI/VCI address is allocated to each subscriber interface of an ATM hub for a data transmission via the ATM-based network. The VPI-VCI addresses are allocated to the respective subscriber interfaces and managed manually in the switching system.

If a fault occurs at a subscriber interface or at a communication terminal connected to the subscriber interface, only the VPI/VCI address of the defective subscriber interface or of the communication terminal connected to the subscriber interface is known in the switching system. It is not possible to find the ATM hub associated with the communication terminal.

A method for finding the association of a communication terminal with a subscriber interface of an ATM hub which is already used is the tracing back of the path in the ATM-based network starting from the switching system to the communication terminal, i.e. determining the path in the ATM-based network by means of the switching information stored in the ATM network nodes. In most cases, however, this is not possible since the operator of the ATM-based network is not, as a rule, the operator of the telecommunication network implemented on this. The switching information stored in the ATM network nodes is thus not available to the operator of the telecommunication network.

Thus, according to the terminology of the ITU-T G.960 Standard (3/93) "access digital section for ISDN basic rate access", especially pages 2 and 3, the present invention is based on data transmission occurring at the V reference point.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a method for determining the ATM hub associated with a communication terminal in a simple manner.

It is another object of the invention to provide a method that can easily be implemented without making changes at the interface between switching system and ATM hub.

It is an additional object of the invention to provide a method wherein the susceptibility to faults is reduced by an automatic detection of the association between a communication terminal and an ATM hub.

It is a further object of the invention to provide a method wherein existing free transmission capacities are utilized by way of a monitor channel for transmitting the address of an ATM hub to a switching system.

These and other objects of the invention will become apparent from a review of the following detailed description of the preferred embodiment,

which is to be read in conjunction with a review of the accompanying drawing figures.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 shows a diagrammatic representation of an IOM-2 data format;

Figure 2 shows a diagrammatic representation of essential functional units according to the present invention;

Figure 3 shows a diagrammatic representation of a conversion of a time-slot-oriented data format into an ATM data format according to the present invention; and

Figure 4 shows a diagrammatic representation of a conversion of another time-slot-oriented data format into an ATM data format according to the present invention.

DETAILED DESCRIPTION OF THE REFERRED EMBODIMENTS

To obtain a better understanding of the operation of a transmission of time-slot-oriented data between an exchange termination and a line termination, here is a discussion of basic principles.

Time-slot-oriented data are usually transmitted between an

exchange termination and a line termination on the basis of a known data format. An example of which is IOM-2 described in the product document "ICs for Communications - IOM®-2 Interface Reference Guide" by Siemens, Munich, 3/91, order No. B115-H6397-X-X-7600, particularly pages 6 to 12.

Figure 1 shows a diagrammatic representation of the IOM-2 data format wherein time division multiplex frames IOM-R having a length of 125 µs are periodically transmitted. Such a time-division multiplex frame IOM-R is divided into time-division multiplex channels or subframes CH0 - CH7, which are frequently simply called 'channels' in the literature.

The subframes CH0 - CH7, in turn, are subdivided into two 8-bit-long payload channels B1, B2, into an 8-bit-long monitor channel M, into a 2-bit-long control information channel DI, into a 4-bit-long status channels C/I (Command/Indicate), and into two monitor status channels MR, MX which in each case have a length of 1 bit. The control information channel DI, the status channel C/I and the two monitor status channels MR, MX are usually combined and referred to as a control information channel D. Channel D is sometimes referred to as signaling channel D.

Via the user data channels B1, B2, user data are transmitted between facilities connected to an IOM-2 bus with a transmission bit rate of 64 kbit/s in each case. Via the control information channel D, control information associated with the user data are transmitted at a transmission

bit rate of 16 kbit/s. The monitor channel is used, among other things, for configuring facilities connected to an IOM-2 bus on the basis of a so-called 'IOM-2 bus master'. Via the monitor status channels MR (Monitor Read) and MX (Monitor Transmit) it is established whether data from a facility connected to the IOM-2 bus are read from the IOM-2 bus (MR = 1, MX = 0) or are output to the IOM-2 bus (MR = 0, MX = 1). Via the status channel C/I, information on real-time requirements existing for a data transmission between two facilities connected to the IOM-2 bus are exchanged.

Figure 2 shows a diagrammatic representation of a PBX (Private Branch Exchange) switching system with an exchange termination (ET) arranged therein. The exchange termination ET is connected to an ATM-based communication network ATM-KN via an interface unit AE.

Furthermore, ATM hubs ATM-HUB, which have subscriber interfaces for connecting communication terminals to the ATM-based communication network ATM-KN, are connected to the ATM-based communication network ATM-KN. Communication terminals KE1 - KEn are shown by way of example.

ISDN (Integrated Services Digital Network) communication terminals are usually connected to the ATM-based communication network ATM-KN by means of S_0 interfaces. Or, digital communication terminals are usually connected to the ATM-based communication network ATM-KN by means of interfaces derived therefrom, such as for example, U_{p0} interfaces, via an

ATM hub. In general, a U_{p0} or an S_0 interface comprises, on the one hand, two user data channels which are equipped with a transmission rate of 64 kbit/s in each case as ISDN-oriented B channels, and on the other hand, a signaling channel configured as an ISDN-oriented D channel with a transmission rate of 16 kbit/s. Furthermore, it is generally possible to connect analog communication terminals to the ATM-based communication network ATM-KN via a/b interfaces.

Communication terminals KE1 - KEn are connected to the ATM hub ATM-HUB. Thus, the subscriber interfaces are provided by the ATM hub ATM-HUB by network terminations NT according to the terminology of the ITU-T G.960 Standard. Based upon the ITU-T G.960 Standard, the network terminations of an ATM hub ATM-HUB are connected to the exchange termination ET of the switching system PBX via a line termination LT arranged in the ATM hub ATM-HUB. For a data transmission via the ATM-based communication network ATM-KN, the line termination LT, corresponding to the exchange termination ET of the switching system PBX , is connected to the ATM-based communication network ATM-KN via an interface unit AE.

Interface units AE provide a bi-directional conversion between the time-slot-oriented IOM-2 data format usually provided for a data transmission between the exchange termination and the line termination, and the packet-oriented ATM data format according to two different conversion modes, which will be explained in greater detail below.

Figure 3 shows a diagrammatic representation of the conversion of the IOM-2 data format into the ATM data format according to the first conversion mode. In this mode, time-slot-oriented data are packed byte by byte into ATM cells according to the first ATM adaptation layer AAL1 on the basis of the CES 2.0 rule of the ATM Forum. The ATM adaptation layer AAL is used for adopting the ATM cell format to the network layer (Layer 3) of the OSI (Open System Interconnection) Reference Model.

In a conversion of the time-slot-oriented data format to the packet-oriented ATM data format, each subframe CHx is allocated an unambiguous VPI/VCI address for transmission via the ATM-based communication network ATM-KN. Thus, data allocated to different subframes CHx, are transmitted in separate ATM cells ATMZ having an unambiguous VPI/VCI address stored in the header H of the ATM cell ATMZ, which is shown by way of example with the VPI/VCI address VPI/VCIx for subframe CH0 and with VPI/VCI address VPI/VCIy for subframe CH1.

In addition to the header H of the ATM cell ATMZ, the first byte in the payload area is defined as pointer Z. This pointer Z points to the first byte of the data allocated to a subframe CHx within the payload area of an ATM cell ATMZ. This pointer Z provides the possibility of restoring synchronization between transmitter and receiver in the case where one or more ATM cells ATMZ have been lost, such as due to a transmission fault.

The first ATM adaptation layer AAL1, in a byte-by-byte manner, converts all 4 channels following one another in time in a subframe CHx, to the ATM cell format according to the ECMA Standard 277 (Standardizing Information and Communication Systems), including the two payload channels B1, B2, the monitor channel M and the control channel D.

Payload information is transmitted beginning with the second byte of the payload area of an ATM cell ATMZ. The data allocated to the individual channels of a subframe CHx, shown by way of example for subframes CH0, CH1 in the figure, are transmitted in succession beginning with the data of the control channel D, followed by the data of the monitor channel M, the data of the first payload channel B1 and the data of the second payload channel B2.

Following insertion of the data of the second payload channel B2 into the payload area of an ATM cell ATMZ, the data of the control channel D of the corresponding following subframe CHx, shown by way of example for subframes CH0, CH1 in the figure, are read in.

Bytes arranged in the payload area of an ATM cell ATMZ are thus allocated to a channel, to the first payload channel B1, to the second payload channel B2, to the monitor channel M and to the control channel D, of a subframe CHx via the position of the byte in the payload area of the ATM cell ATMZ.

Figure 4 shows the conversion of the IOM-2 data format into the ATM data format according to the second conversion mode in a diagrammatic representation. In this mode time-slot-oriented data are packed byte by byte into ATM cells ATMZ according to the second ATM adaptation layer AAL2. In the second ATM adaptation layer AAL2, it is possible to subdivide the payload area of an ATM cell ATMZ into so-called substructure elements SE.

A substructure element SE according to the second ATM adaptation layer AAL2 is composed of a 3-byte-long header SH and a payload area I of variable length (0 to 64 bytes). The header SH of a substructure element SE according to the second ATM adaptation layer AAL2 is in turn subdivided into an 8-bit-long channel identifier CID, a 6-bit-long length indicator LI, a 5-bit-long user-to-user indication UUI, and a 5-bit-long header error control HEC.

Subdividing an ATM cell ATMZ into substructural elements SE makes it possible to define a number of channels by means of the channel identifier CID in an ATM connection, all of which channels are addressed with the same ATM address consisting of a VPI value and a VCI value.

During a data transmission between the switching system PBX and an ATM hub ATM-HUB, particularly in exchange termination ET and line

termination LT, it is thus possible to define substructural elements SE for the transmission of channel-oriented data of a subframe CHx.

In addition to the header H of the ATM cell ATMZ, the first byte in the payload area is defined as pointer Z. This pointer Z points to the first byte of a substructural element SE arranged in the payload area of an ATM cell ATMZ. This pointer Z can be used for restoring synchronization between transmitter and receiver in the case where one or more ATM cells ATMZ have been lost, such as due to a transmission fault.

In the present embodiment, an individual substructural element SE is defined for the first payload channel B1, the second payload channel B2, the monitor channel M, and the control channel D, and is then transmitted in the payload area of the ATM cell ATMZ. By way of example, a payload area I of the substructural element SE with a length of 4 bytes is shown in Figure 4. Following the substructural element SE allocated to the control channel D, the substructural element SE allocated to the first payload channel B1 of the corresponding subframe CHx is transmitted in the payload area of an ATM cell ATMZ.

In the case of an ATM cell ATMZ according to the second ATM adaptation layer AAL2, in contrast to an ATM cell ATMZ according to the first ATM adaptation layer AAL1, a payload byte is allocated to a channel, to the first payload channel B1, to the second payload channel B2, to the monitor channel M and to the control channel D, of a subframe CHx not via

the position of the payload byte in the payload area of the ATM cell ATMZ but via the channel identifier CID.

For addressing a communication terminal KE1 - KEn connected to an ATM hub ATM-HUB, only the VPI/VCI address allocated to the communication terminal KE1 - KEn in the ATM-based communication network ATM-KN is known in the switching system PBX. Thus, it is not possible, for the reasons known in the introduction to the description, to locate the terminal KE1 - KEn in the ATM-based communication network ATM-KN, i.e. to associate it with an ATM hub ATM-HUB.

According to the present invention, an unambiguous address is allocated to each ATM hub ATM-HUB and, if necessary, each ATM network node in the ATM-based communication network ATM-KN for locating a communication terminal KE1 - KEn. This address is stored in a non-volatile memory of the ATM hub ATM-HUB and can be retrieved on request. If, for example, a fault is reported to the switching system PBX, or if it is necessary for any other reason to determine the association of a communication terminal KE1 - KEn with an ATM hub, the switching system PBX transmits a corresponding request message by means of the VPI/VCI address of the communication terminal KE1 - KEn stored in the switching system PBX.

For such a request message, the bits transmitted in the monitor status channels MR, MX are both set to the value 1 (MR = 1, MX = 1) or

alternatively to the value 0 (MR = 0, MX = 0). Furthermore, it is possible to establish a special protocol by means of which a message transmitted by the switching system PBX to a communication terminal KE1 - KEn is identified as a request message. This protocol can then be transmitted via the control information channel D or the monitor channel M from the switching system PBX to the ATM hub ATM-HUB associated with the corresponding communication terminal KE1 - KEn.

If an ATM hub ATM-HUB receives such a request message (MR = 1, MX = 1 or MR = 0, MX = 0), the ATM hub ATM-HUB transmits the address allocated to it in the ATM-based communication network ATM-KN via the monitor channel M according to the IOM-2 data format. The switching system PBX can associate the wanted communication terminal KE1 - KEn with an ATM hub ATM-HUB by means of the address transmitted via the monitor channel M.

The address of the ATM hub ATM-HUB is advantageously octet-oriented, i.e. the length of the address is a multiple m (m = 1, 2, 3, ...) of one byte. This provides for simple transmission of the address via the monitor channel M since the latter has a bandwidth of one byte per time-division multiplex frame IOMR.

Although modifications and changes may be suggested by those skilled in the art to which this invention pertains, it is the intention of the inventors to embody within the patent warranted hereon, all changes and

modifications that may reasonably and properly come under the scope of their contribution to the art. - -

Description

Method for identifying a hub involved in a connection between a communication terminal and a switching system

The invention is based on a transmission system for transmitting time-slot-oriented data between an exchange termination (ET) and a line termination (LT). According to the terminology of the ITU-T G.960 Standard (3/93) "access digital section for ISDN basic rate access", especially pages 2 and 3, the invention is accordingly based on a data transmission at the so-called V reference point.

A transmission system for transmitting time-slot-oriented data between an exchange termination and a line termination is usually part of a communication system having a switching facility and subscriber line facilities. The subscriber line facilities have subscriber interfaces for connecting communication terminals to the communication system. According to the ITU-T G.960 Standard, the subscriber line facilities are connected to the switching facility of the communication system via a line termination and an exchange termination. Such a communication system is used for setting up and, respectively, clearing down narrow-band communication connections between communication terminals connected to the subscriber line facilities and to provide for narrow-band communication - for example voice or data communication - between the communication terminals.

In modern communication systems, data transmission between the exchange termination and the line termination usually takes place on the basis of the time-

slot-oriented data format IOM-2 (ISDN Oriented Modular Interface) formed from a periodic sequence of channel-individual information segments - called time-division multiplex channel in the text which follows. As a rule, one time-division multiplex channel is in each case allocated to each subscriber interface of a subscriber line facility in this arrangement.

In modern communication engineering, there is a need for broadband transmission of information such as, for example, still and moving pictures in videophone applications or of large volumes of data in the Internet. This increases the significance of transmission techniques for high and variable data transmission rates (greater than 100 Mbit/s) which take into account both the requirements of the data transmission (high speed at variable transmission bit rate) and the requirements of voice data transmission (maintaining time correlations with a data transmission via a network) so that the separate networks currently existing for the various purposes can be integrated in one network. A known data transmission method for high data speeds is the so-called Asynchronous Transfer Mode (ATM). Data transmission on the basis of the Asynchronous Transfer Mode currently enables a variable transmission bit rate of up to 622 Mbit/s to be obtained.

In the cell-based data transmission method known as Asynchronous Transfer Mode (ATM), so-called ATM cells are used for transporting fixed-length data packets. An ATM cell is composed of a so-called "header" with a length of five bytes which contains switching data relevant to the transportation of an ATM cell, and a so-called "payload" with a length of 48 bytes.

Data transmission via an ATM-based network generally takes place in so-called virtual paths or virtual channels. For this purpose, interconnection tables with

switching information consisting of a virtual channel identifier and of a virtual path identifier are set up in the respective ATM network nodes of the ATM-based network by an exchange of signaling information during a connection set-up before the beginning of the actual user data transmission. In the interconnection tables, a so-called VCI value is assigned to the virtual channel identifier and a so-called VPI value is assigned to the virtual path identifier. The switching information entered in the interconnection table of an ATM network node establishes how the virtual paths or, respectively, virtual channels contained in the virtual paths of the incoming and outgoing connections at the ATM network node are correlated with one another by the signaling, that is to say which input is connected to which output by a switching. ATM cells transmitted via these virtual connections (virtual paths and virtual channels) have switching data essentially consisting of a VPI value and a VCI value in the header. The ATM header data are processed, i.e. the switching data arranged therein are detected and evaluated at the input of an ATM network node. The ATM cells are then switched through by the ATM network node to an output of the ATM network node representing a certain destination by means of the switching information stored in the interconnection table.

From German Offenlegungsschrift DE 196 04 244 A1, a transmission system between an exchange termination and a line termination is known in which the transmission is implemented via an ATM-based network. In this arrangement, subscriber interfaces for connecting ISDN (Integrated Services Digital Network) oriented communication terminals by ATM hubs connected to the ATM-based network are provided. The exchange termination of the communication system and the line termination implemented by the ATM hub

in each case have an ATM interface unit via which, on the one hand, a connection to the ATM-based network is implemented and, on the other hand, the IOM-2 data format usually provided for a data transmission between the exchange termination and the line termination is converted to the ATM-based data format or, respectively, the ATM-based data format is converted to the IOM-2 data format.

For addressing a subscriber interface of the ATM hub via the ATM-based network, a permanently set up ATM channel of the ATM-based network is allocated to each time-division multiplex channel of the IOM-2 data format, i.e. an unambiguous VPI/VCI address is allocated to each subscriber interface of an ATM hub for a data transmission via the ATM-based network. The VPI-VCI addresses are allocated to the respective subscriber interfaces and managed manually in the switching system.

If a fault occurs at a subscriber interface or at a communication terminal connected to the subscriber interface, only the VPI/VCI address of the defective subscriber interface or of the communication terminal connected to the subscriber interface is known in the switching system. It is not possible to find the ATM hub associated with the communication terminal.

A method for finding the association of a communication terminal with a subscriber interface of an ATM hub which is already used is the tracing back of the path in the ATM-based network starting from the switching system to the communication terminal, i.e. determining the path in the ATM-based network by means of the switching information stored in the ATM network nodes. In most cases, however, this is not possible since the operator of the ATM-based network is not, as a rule, the operator of the

telecommunication network implemented on this. The switching information stored in the ATM network nodes is thus not available to the operator of the telecommunication network.

The present invention is based on the object of specifying a method by means of which the ATM hub associated with a communication terminal can be determined in a simple manner.

The object is achieved, on the basis of the features of the preamble of claim 1, by its characterizing features.

To obtain a better understanding of the operation of a transmission of time-slot-oriented data between an exchange termination and a line termination, it appears to be necessary first to discuss known principles in greater detail.

The time-slot-oriented data are usually transmitted between the exchange termination and the line termination on the basis of the data format IOM-2 known, for example, from the product document "ICs for Communications - IOM®-2 Interface Reference Guide" by Siemens, Munich, 3/91, order No. B115-H6397-X-X-7600, particularly pages 6 to 12.

Figure 1 serves to provide a quicker understanding of the relationships and shows a diagrammatic representation of the IOM-2 data format according to which time division multiplex frames IOM-R having a length of 125 μs are periodically transmitted. Such a time-division multiplex frame IOM-R is divided into time-division multiplex channels or subframes CH0, .., CH7 - also frequently simply called 'channel' in the literature. The subframes CH0, .., CH7, in turn, are in each case subdivided into two 8-bit-long payload channels B1, B2, into an 8-bit-long monitor channel M, into a 2-bit-long

control information channel DI, into a 4-bit-long status channels C/I (Command/Indicate) and two monitor status channels MR, MX which in each case have a length of 1 bit. The control information channel DI, the status channel C/I and the two monitor status channels MR, MX are usually combined in the term control channel D.

Via the user data channels B1, B2, user data are transmitted between facilities connected to an IOM-2 bus with a transmission bit rate of 64 kbit/s in each case. Via the control information channel D, control information associated with the user data are transmitted at a transmission bit rate of 16 kbit/s. The monitor channel is used, among other things, for configuring facilities connected to an IOM-2 bus on the basis of a so-called 'IOM-2 bus master'. Via the monitor status channels MR (Monitor Read) and MX (Monitor Transmit) it is established whether data from a facility connected to the IOM-2 bus are read from the IOM-2 bus (MR = 1, MX = 0) or are output to the IOM-2 bus (MR = 0, MX = 1). Via the status channel C/I, information on real-time requirements existing for a data transmission between two facilities connected to the IOM-2 bus are exchanged.

An essential advantage of the method according to the invention then consists in that the method can be implemented in a simple manner in systems already in existence without having to make changes at the interface between switching system and ATM hub - called V reference point according to the terminology of the ITU-T G.960 Standard.

A further advantage of the method according to the invention consists in that the susceptibility to faults is reduced in contrast to the previous manual detection due to an automatic detection of the association between a communication terminal and an ATM hub.

Advantageous further developments of the invention are specified in the subclaims.

An advantage of embodiments of the invention defined in the subclaims consists in, among other things, that existing free transmission capacities are utilized due to the utilization of the monitor channel for transmitting the address of the ATM hub to the switching system.

In the text which follows, an exemplary embodiment of the invention will be explained in greater detail with reference to the drawing, in which:

Figure 2 shows a structural diagram for the diagrammatic representation of the essential functional units involved in the method according to the invention;

Figure 3 shows a diagrammatic representation of the conversion of the time-slot-oriented IOM-2 data format into the ATM data format according to a first conversion mode;

Figure 4 shows a diagrammatic representation of the conversion of the time-slot-oriented IOM-2 data format into the ATM data format according to a second conversion mode.

Figure 2 shows a diagrammatic representation of a switching system PBX (Private Branch Exchange) with an exchange termination (ET) arranged therein. The exchange termination ET is connected to an ATM-based communication network ATM-KN via an interface unit AE. Furthermore, ATM hubs ATM-HUB which have subscriber interfaces for connecting communication terminals to the ATM-based communication network ATM-KN are connected to the ATM-based communication

network ATM-KN. Communication terminals KE1,...,KEn are shown by way of example.

ISDN (Integrated Services Digital Network) communication terminals are usually connected to the ATM-based communication network ATM-KN by means of S_0 interfaces or digital communication terminals are usually connected to the ATM-based communication network ATM-KN by means of interfaces derived therefrom, such as, for example, U_{p0} interfaces, via an ATM hub. In general, a U_{p0} or an S_0 interface comprises, on the one hand, two user data channels which are equipped with a transmission rate of 64 kbit/s in each case as ISDN-oriented B channels and, on the other hand, a signaling channel which is configured as ISDN-oriented D channel with a transmission rate of 16 kbit/s. Furthermore, it is generally possible to connect analog communication terminals to the ATM-based communication network ATM-KN via a/b interfaces.

The communication terminals KE1,...,KEn are connected to the ATM hub ATM-HUB, i.e. the subscriber interfaces are provided by the ATM hub ATM-HUB by network terminations NT according to the terminology of the ITU-T G.960 Standard. According to the ITU-T G.960 Standard, the network terminations of an ATM hub ATM-HUB are connected to the exchange termination ET of the switching system PBX via a line termination LT arranged in the ATM hub ATM-HUB. For a data transmission via the ATM-based communication network ATM-KN, the line termination LT - corresponding to the exchange termination ET of the switching system PBX - is connected to the ATM-based communication network ATM-KN via an interface unit AE.

The interface units AE provide a bidirectional conversion between the time-slot-oriented IOM-2 data format usually provided for a data transmission between the exchange termination and the line

termination, and the packet-oriented ATM data format according to two different conversion modes which will be explained in greater detail below.

Figure 3 shows the conversion of the IOM-2 data format into the ATM data format according to the first conversion mode in a diagrammatic representation. In this mode, time-slot-oriented data are packed byte by byte into ATM cells according to the first ATM adaptation layer AAL1 on the basis of the CES 2.0 rule of the ATM Forum. The ATM adaptation layer AAL is used for adopting the ATM cell format to the network layer (layer 3) of the OSI (Open System Interconnection) Reference Model.

In a conversion of the time-slot-oriented data format to the packet-oriented ATM data format, each subframe CHx is allocated an unambiguous VPI/VCI address for transmission via the ATM-based communication network ATM-KN, i.e. data allocated to different subframes CHx are transmitted in separate ATM cells ATMZ having an unambiguous VPI/VCI address stored in the header H of the ATM cell ATMZ - shown by way of example with the VPI/VCI address VPI/VCIx for subframe CH0 and with VPI/VCI address VPI/VCIy for subframe CH1.

In addition to the header H of the ATM cell ATMZ, the first byte in the payload area is defined as pointer Z. This pointer Z points to the first byte of the data allocated to a subframe CHx within the payload area of an ATM cell ATMZ. This pointer Z provides the possibility of restoring synchronization between transmitter and receiver in the case where one or more ATM cells ATMZ have been lost, for example due to a transmission fault.

The first ATM adaptation layer AAL1 converts all 4 channels following one another in time in a subframe CHx -

the two payload channels B1, B2, the monitor channel M and the control channel D - byte-by-byte to the ATM cell format according to the ECMA Standard 277 (Standardizing Information and Communication Systems). The payload information is transmitted beginning with the second byte of the payload area of an ATM cell ATMZ. The data allocated to the individual channels of a subframe CHx - shown by way of example for subframes CH0, CH1 in the figure - are transmitted in succession beginning with the data of the control channel D, followed by the data of the monitor channel M, the data of the first payload channel B1 and the data of the second payload channel B2. Following the insertion of the data of the second payload channel B2 into the payload area of an ATM cell ATMZ, the data of the control channel D of the corresponding following subframe CHx - shown by way of example for subframes CH0, CH1 in the figure - are read in.

The bytes arranged in the payload area of an ATM cell ATMZ are thus allocated to a channel - to the first payload channel B1, to the second payload channel B2, to the monitor channel M and to the control channel D - of a subframe CHx via the position of the byte in the payload area of the ATM cell ATMZ.

Figure 4 shows the conversion of the IOM-2 data format into the ATM data format according to the second conversion mode in a diagrammatic representation. In this mode time-slot-oriented data are packed byte by byte into ATM cells ATMZ according to the second ATM adaptation layer AAL2. In the second ATM adaptation layer AAL2, it is possible to subdivide the payload area of an ATM cell ATMZ into so-called substructure elements SE.

A substructure element SE according to the second ATM adaptation layer AAL2 is composed of a 3-byte-long header SH and a payload area I of variable length (0 to 64 bytes). The header SH of a substructure element SE

according to the second ATM adaptation layer AAL2 is in turn subdivided into an 8-bit-long channel identifier CID, a 6-bit-long length indicator LI, a 5-bit-long user-to-user indication UUI and a 5-bit-long header error control HEC.

Subdividing an ATM cell ATMZ into substructural elements SE makes it possible to define a number of channels by means of the channel identifier CID in an ATM connection, all of which channels are addressed with the same ATM address consisting of a VPI value and a VCI value. During a data transmission between the switching system PBX and an ATM hub ATM-HUB, particularly in exchange termination ET and line termination LT, it is thus possible to define substructural elements SE for the transmission of channel-oriented data of a subframe CHx.

In addition to the header H of the ATM cell ATMZ, the first byte in the payload area is defined as pointer Z. This pointer Z points to the first byte of a substructural element SE arranged in the payload area of an ATM cell ATMZ. This pointer Z can be used for restoring synchronization between transmitter and receiver in the case where one or more ATM cells ATMZ have been lost, for example due to a transmission fault.

In the present exemplary embodiment, an individual substructural element SE is defined for the first payload channel B1, the second payload channel B2, the monitor channel M and the control channel D and is transmitted in the payload area of the ATM cell ATMZ. By way of example, a payload area I of the substructural element SE with a length of 4 bytes is shown in the figure. Following the substructural element SE allocated to the control channel D, the

substructural element SE allocated to the first payload channel B1 of the corresponding subframe CHx is transmitted in the payload area of an ATM cell ATMZ.

In the case of an ATM cell ATMZ according to the second ATM adaptation layer AAL2, in contrast to an ATM cell ATMZ according to the first ATM adaptation layer AAL1, a payload byte is allocated to a channel - to the first payload channel B1, to the second payload channel B2, to the monitor channel M and to the control channel D - of a subframe CHx not via the position of the payload byte in the payload area of the ATM cell ATMZ but via the channel identifier CID.

For addressing a communication terminal KE1,...,KEn connected to an ATM hub ATM-HUB, only the VPI/VCI address allocated to the communication terminal KE1,...,KEn in the ATM-based communication network ATM-KN is known in the switching system PBX. It is thus not possible, for the reasons known in the introduction to the description, to locate the terminal KE1,...,KEn in the ATM-based communication network ATM-KN, i.e. to associate it with an ATM hub ATM-HUB.

According to the invention, an unambiguous address is allocated to each ATM hub ATM-HUB and, if necessary, each ATM network node in the ATM-based communication network ATM-KN for locating a communication terminal KE1,...,KEn. This address is stored in a non-volatile memory of the ATM hub ATM-HUB and can be retrieved on request. If, for example, a fault is reported to the switching system PBX or if it is necessary for any other reason to determine the association of a communication terminal KE1,...,KEn with an ATM hub, the switching system PBX transmits a corresponding request message by means of the VPI/VCI address of the communication terminal KE1,...,KEn stored in the switching system PBX.

For such a request message, the bits transmitted in the monitor status channels MR, MX are both set to the value 1 (MR = 1, MX = 1) or alternatively to the value 0 (MR = 0, MX = 0). Furthermore, it is possible to establish a special protocol by means of which a message transmitted by the switching system PBX to a communication terminal KE1,...,KEn is identified as request message. This protocol can then be transmitted via the signaling channel D or the monitor channel M from the switching system PBX to the ATM hub ATM-HUB associated with the corresponding communication terminal KE1,...,KEn.

If an ATM hub ATM-HUB receives such a request message (MR = 1, MX = 1 or MR = 0, MX = 0), the ATM hub ATM-HUB transmits the address allocated to it in the ATM-based communication network ATM-KN via the monitor channel M according to the IOM-2 data format. The switching system PBX can associate the wanted communication terminal KE1,...,KEn with an ATM hub ATM-HUB by means of the address transmitted via the monitor channel M.

The address of the ATM hub ATM-HUB is advantageously octet-oriented, i.e. the length of the address is a multiple m (m = 1, 2, 3, ...) of one byte. This provides for simple transmission of the address via the monitor channel M since the latter has a bandwidth of one byte per time-division multiplex frame IOMR.

Patent Claims

1. A method for identifying a hub (ATM-HUB) involved in a connection between a communication terminal (KE1,...,KEn) and a switching system (PBX), a plurality of hubs (ATM-HUB) being connected to the switching system (PBX) via a communication network (ATM-KN) and a time-slot-oriented data format (IOM-2) formed from a periodic sequence of channel-oriented information segments (B1, B2, M, D) being set up for a data transmission between the switching system (PBX) and the communication terminals (KE1,...,KEn) connected to the hubs (ATM-HUB),
characterized in that the hubs (ATM-HUB) are associated with an unambiguous address in the communication network (ATM-KN) and that, on request, the address of a hub (ATM-HUB) is transmitted by the latter to the switching system (PBX) in an agreed information segment (M).

2. The method as claimed in claim 1, characterized in that the request is made during a message transmission from the switching system (PBX) to the communication terminal (KE1,...,KEn).

3. The method as claimed in claim 1, characterized in that the request is made during a message transmission from the communication terminal (KE1,...,KEn) to the switching system (PBX).

4. The method as claimed in one of the preceding claims, characterized in that the address is transmitted in a monitor channel (M) transmitting configuration information, of the time-slot-oriented data format (IOM-2).

5. The method as claimed in one of the preceding claims, characterized in that the request is indicated by transmitting an agreed bit combination in a signaling channel (D) of the time-slot-oriented data format (IOM-2).

6. The method as claimed in one of the preceding claims 1 to 4, characterized in that the request is indicated by a simplified protocol being transmitted in the signaling channel (D) and/or in a monitor channel (M), transmitting configuration information, of the time-slot-oriented data format (IOM-2).

7. The method as claimed in one of the preceding claims, characterized in that the time-slot-oriented data format (IOM-2) is the standardized IOM-2 data format.

8. The method as claimed in claim 7, characterized in that the request is indicated by bits transmitted via monitor status channels (MR, MX) of the IOM-2 data format to the hub (ATM-HUB) being identical (MR = MX = 1; MR = MX = 0).

9. The method as claimed in one of the preceding claims, characterized in that the address length is 1 byte or an integral multiple thereof.

10. The method as claimed in one of the preceding claims, characterized in that a data transmission via the communication network (ATM-KN) takes place on the basis of the ATM (Asynchronous Transfer Mode) data format.

11. The method as claimed in claim 10, characterized in that a bidirectional conversion is made between the time-slot-oriented data format (IOM-2) and the ATM data format for transmitting data via the communication network (ATM-KN) by the switching system (PBX) and the hub (ATM-HUB).

12. The method as claimed in claim 11, characterized in that the bidirectional conversion between the time-slot-oriented data format (IOM-2) and the ATM data format takes place in accordance with a convention known as first ATM adaptation layer AAL-Typ1.

13. The method as claimed in claim 11, characterized in that the bidirectional conversion between the time-slot-oriented data format (IOM-2) and the ATM data format takes place in accordance with a convention known as second ATM adaptation layer AAL-Typ2.

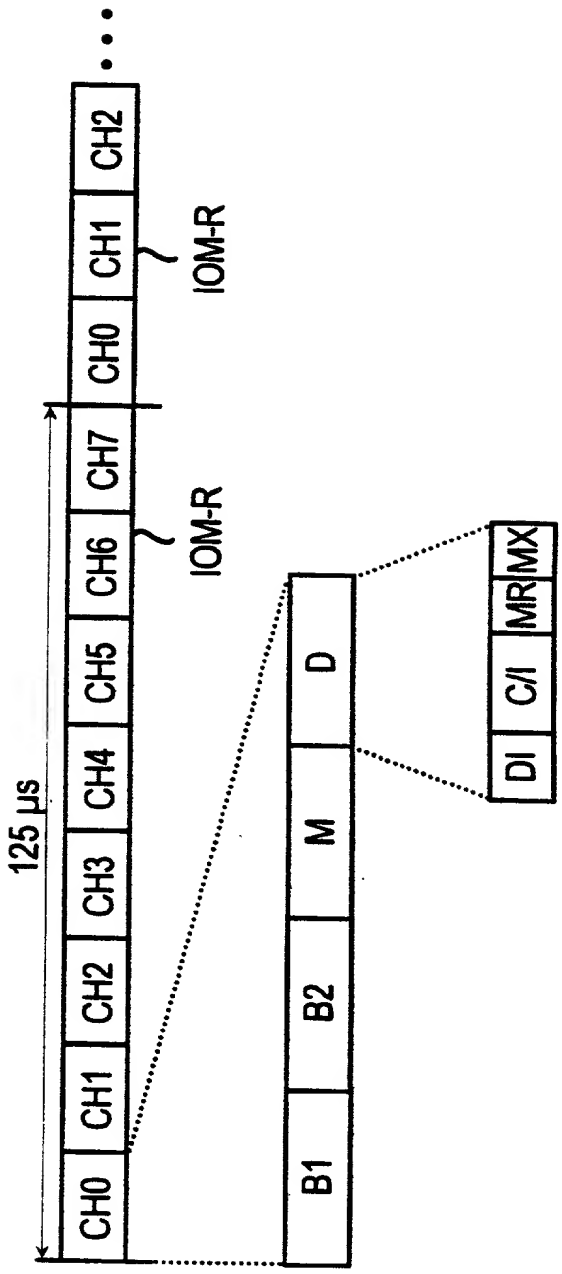
Abstract

Method for identifying a hub involved in a connection between a communication terminal and a switching system

The communication terminals (KE1,...,KEn) are connected to the communication network (ATM-KN) via at least one hub (ATM-HUB) having an unambiguous address in the communication network (ATM-KN). For a data transmission between the switching system (PBX) and the communication terminals (KE1,...,KEn), a time-slot-oriented data format (IOM-2) formed from a periodic sequence of channel-oriented information segments (B1, B2, M, D) is provided. On request, the address of the hub (ATM-HUB) is transmitted from the hub (ATM-HUB) to the switching system (PBX) in an agreed information segment (M).

Figure 2

Fig 1



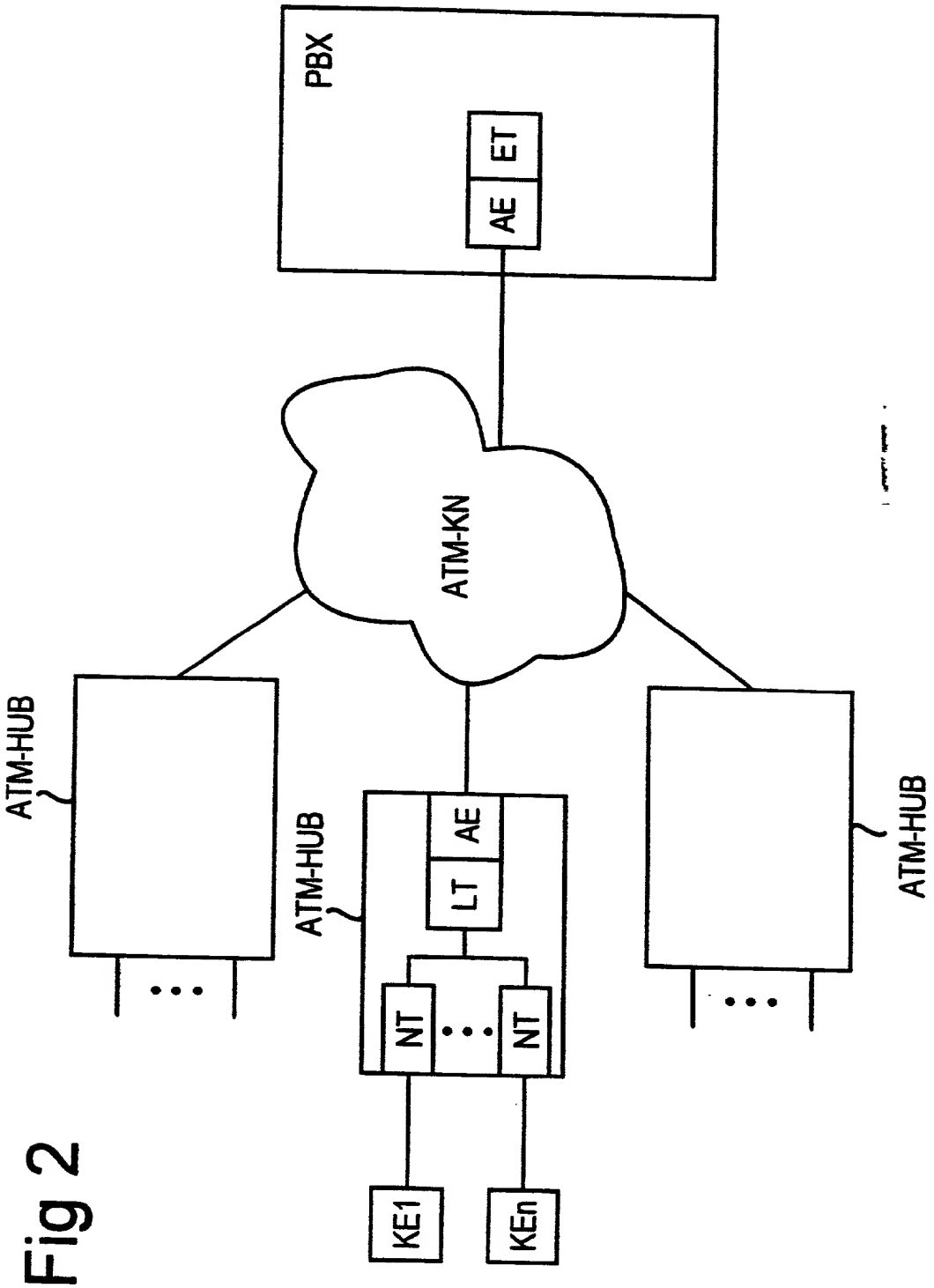


Fig 2

Fig 3

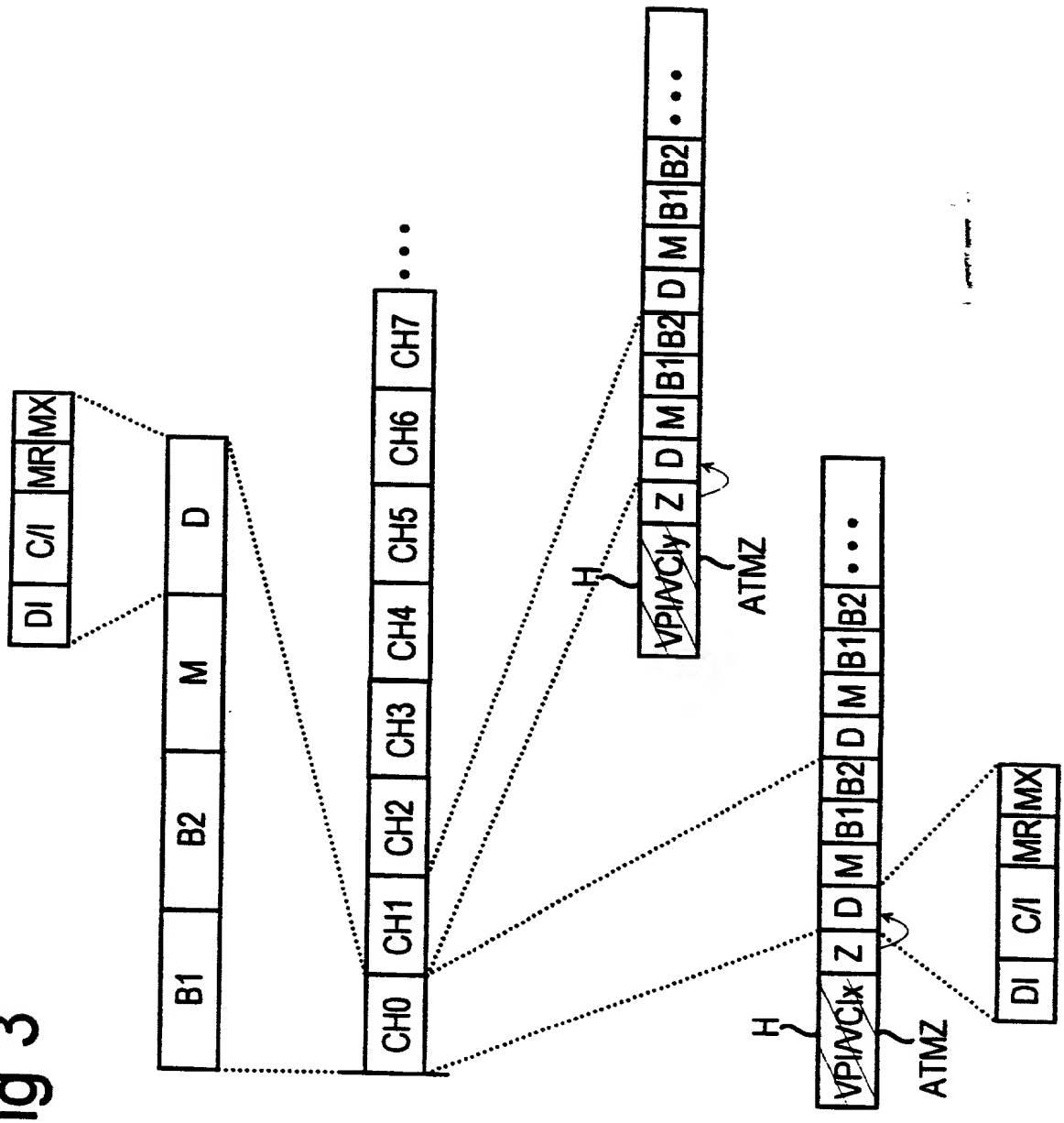
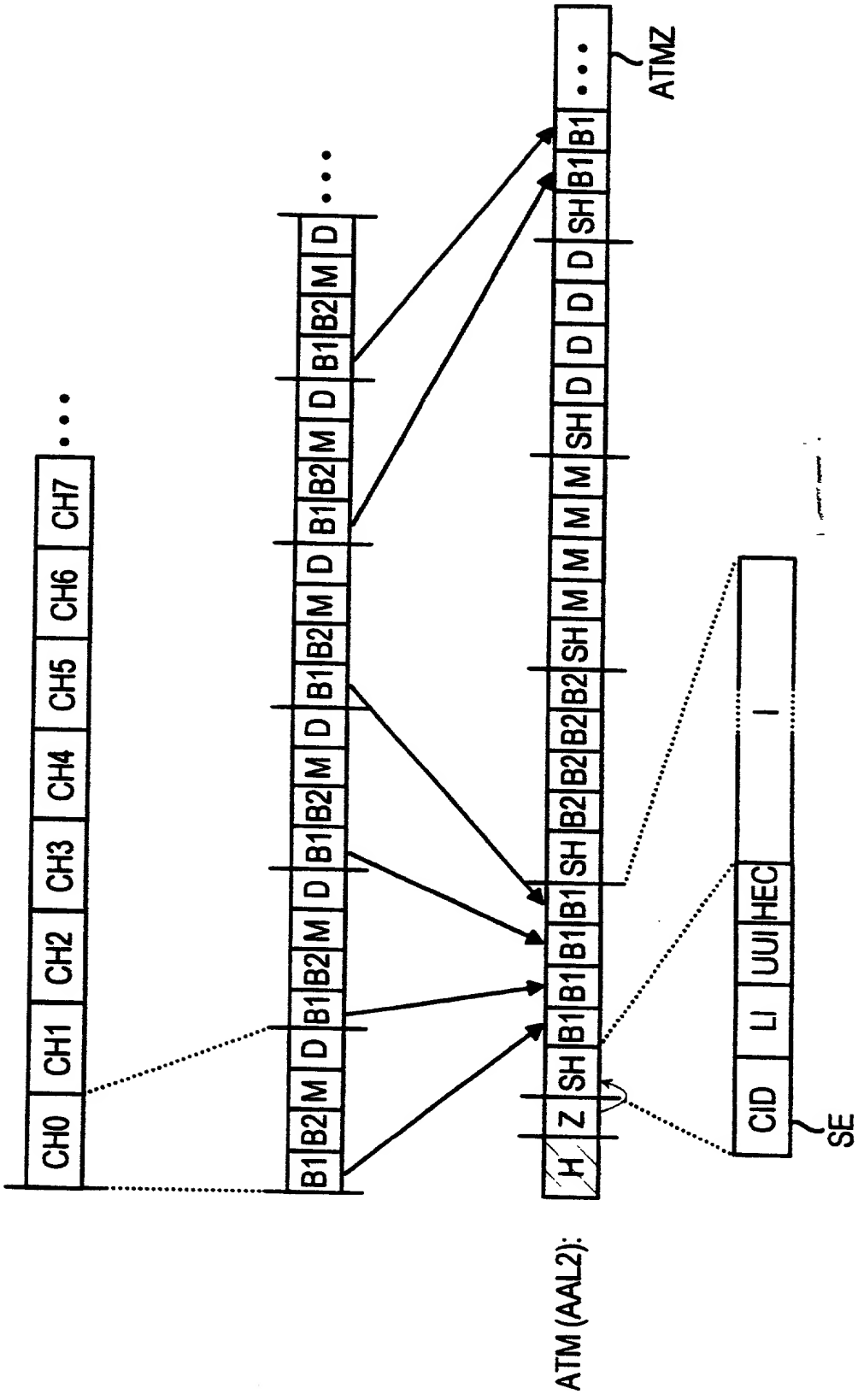

DI
C/I
MR
MX
B1
B2
M
D
CH0
CH1
CH2
CH3
CH4
CH5
CH6
CH7
H
VPI/VCIy
Z
D
M
B1
B2
ATMZ
H
VPI/VCIx
Z
D
M
B1
B2
ATMZ
DI
C/I
MR
MX

Fig 4



Declaration and Power of Attorney For Patent Application
Erklärung Für Patentanmeldungen Mit Vollmacht
German Language Declaration

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

As a below named inventor, I hereby declare that.

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

My residence, post office address and citizenship are as stated below next to my name,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Verfahren zur Identifizierung einer, an einer Verbindung zwischen einem Kommunikationsendgerät und einer Vermittlungsanlage beteiligten Übergabeeinheit

deren Beschreibung

the specification of which

(zutreffendes ankreuzen)

(check one)

☒ hier beigefügt ist.

☒ is attached hereto.

☐ am _____ als PCT internationale Anmeldung PCT Anmeldungsnummer _____ eingereicht wurde und am _____ abgeändert wurde (falls tatsächlich abgeändert).

☐ was filed on _____ as PCT international application PCT Application No. _____ and was amended on _____ (if applicable)

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1 56(a) von Wichtigkeit sind, an.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

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German Language Declaration

Prior foreign appplications
Priorität beansprucht

			Priority Claimed	
198 43 625.4	Germany	23.. September 1998	☒	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein
			☐	☐
(Number) (Nummer)	(Country) (Land)	(Day Month Year Filed) (Tag Monat Jahr eingereicht)	Yes Ja	No Nein

Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozeßordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35 United States Code. §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occured between the filing date of the prior application and the national or PCT international filing date of this application.

(Application Serial No.) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgegeben)	(Status) (patented, pending, abandoned)
(Application Serial No) (Anmeldeseriennummer)	(Filing Date) (Anmeldedatum)	(Status) (patentiert, anhängig, aufgeben)	(Status) (patented, pending, abandoned)

Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gultigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentes gefährden können.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

German Language Declaration

VERTRETUNGSVOLLMACHT: Als benannter Erfinder beauftrage ich hiermit den nachstehend benannten Patentanwalt (oder die nachstehend benannten Patentanwälte) und/oder Patent-Agenten mit der Verfolgung der vorliegenden Patentanmeldung sowie mit der Abwicklung aller damit verbundenen Geschäfte vor dem Patent- und Warenzeichenamt: *(Name und Registrationsnummer anführen)*

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. *(list name and registration number)*

And I hereby appoint

Messrs. John D. Simpson (Registration No. 19,842) Lewis T. Steadman (17,074), William C. Stueber (16,453), P. Phillips Connor (19,259), Dennis A. Gross (24,410), Marvin Moody (16,549), Steven H. Noll (28,982), Brett A. Valiquet (27,841), Thomas I. Ross (29,275), Kevin W. Guynn (29,927), Edward A. Lehmann (22,312), James D. Hobart (24,149), Robert M. Barrett (30,142), James Van Santen (16,584), J. Arthur Gross (13,615), Richard J. Schwarz (13,472) and Melvin A. Robinson (31,870), David R. Metzger (32,919), John R. Garrett (27,888) all members of the firm of Hill, Steadman & Simpson, A Professional Corporation.

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(Supply similar information and signature for third and subsequent joint inventors).

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